

WHAT IS CLAIMED IS:

1. A ceramic member being usable in a state where at least a part thereof is exposed in a reactor in which halogen plasma is generated, comprising:

a base member containing a first ceramic material as a main component; and

5 a coating layer on a surface of the base member, the surface of the base member facing an inside of the reactor, and the coating layer containing a second ceramic material more resistant to plasma etching than the first ceramic material as a main component,

wherein the coating layer includes a thick portion in a region where an etching
10 rate of the coating layer by the halogen plasma is locally high, and a thickness (tt) of the thick portion and a thickness (tn) of a normal thickness portion other than the thick portion satisfy the following expression (1):

$$t_n < t_t \leq (E_e/E_n) \times t_n \dots\dots\dots (1)$$

where E_n : etching rate of the coating layer in the normal thickness portion; and

15 E_e : etching rate of the coating layer in the thick portion.

2. A ceramic member being usable in a state where at least a part thereof is exposed in a reactor in which halogen plasma is generated, comprising:

a base member containing a first ceramic material as a main component; and

20 a coating layer on a surface of the base member, the surface of the base member facing an inside of the reactor, and the coating layer containing a second ceramic material more resistant to plasma etching than the first ceramic material as a main component,

wherein the coating layer locally includes a thick portion, and a thickness (tt)
25 of the thick portion and a thickness (tn) of a normal thickness portion other than the thick portion satisfy the following expression (2):

$$t_n < t_t \leq 3 \times t_n \dots\dots\dots (2).$$

3. The ceramic member according to claim 1, wherein the thickness (tt) of the thick portion is 8 mm or less, and the thickness (tn) of the normal thickness portion is 5 mm or less.

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4. The ceramic member according to claim 1, wherein a surface area of the coating layer is $1 \times 10^6 \text{ mm}^2$ or less, and the thickness (tt) of the thick portion is 1.5 mm or less.

10 5. The ceramic member according to claim 1, wherein a surface area of the coating layer is $5 \times 10^5 \text{ mm}^2$ or less, and the thickness (tt) of the thick portion is 3 mm or less.

6. The ceramic member according to claim 1, wherein a surface area of the coating layer is $1 \times 10^5 \text{ mm}^2$ or less, and the thickness (tt) of the thick portion is 6 mm or less.

15 7. The ceramic member according to claim 1, wherein the first ceramic material is alumina.

8. The ceramic member according to claim 1, wherein the second ceramic material is any of yttria and a composite oxide containing yttria and aluminum.

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9. The ceramic member according to claim 1, wherein the first ceramic material is at least one material selected from the group consisting of silicon nitride, aluminum nitride and silicon carbide.

25 10. The ceramic member according to claim 1, wherein the second ceramic material is diamond.

11. The ceramic member according to claim 1, wherein the second ceramic material is alkaline-earth fluoride.

12. The ceramic member according to claim 1, wherein the ceramic member is a member composing an inner wall of the reactor of plasma treatment apparatus.

13. The ceramic member according to claim 1, wherein the thick portion is formed on the coating layer close to a position where an electrode for generating the plasma is disposed.

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14. The ceramic member according to claim 1, wherein the base member has a substantially even thickness.

15. The ceramic member according to claim 1, wherein the base member locally includes a concave portion on the surface where the coating layer is formed, and the thick portion of the coating layer is formed to coat the concave portion.

16. The ceramic member according to claim 1, wherein the coating layer is one formed by use of a plasma flame spraying method.

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17. The ceramic member according to claim 1, wherein the base member and the coating layer are an integrally sintered body formed by use of a gel casting method and then fired integrally.